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## Malaria and Intestinal Helminthes Co-infection among Pregnant Women Attending Antenatal Clinic in Obowo Imo State, Nigeria

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### Abstract

The study was carried out to determine the prevalence Malaria and intestinal helminths Co-infection among pregnant women attending antenatal clinic in Obowo. A total of two hundred (200) Pregnant women were examined using Stool and Blood samples both were analyzed and viewed under the microscope and of which one hundred and fourteen (57.0) were infected with malaria and intestinal helminth Co-infection. The results showed that prevalence of malaria infection, intestinal helminth infections, and co-infection was 26.5%, 19.0%, and 11.5%, respectively. The prevalence of the helminth species found in stool samples of parasitaemic subjects examined was, *Ascaris lumbricoides* (34.2%), *Hookworm* (28.9%), *Gardia lambia* (21.0%) and *Strongyloides*(15.7). This study shows relatively high prevalence rates of malaria, intestinal helminths, and Co-infection in pregnant women in Obowo Local Government Area. Health Education for pregnant women is advocated.

**Keywords :** *Co-infection* Malaria parasite, Helminths, *Plasmodium falciparum*, Pregnant women

## Introduction

In Sub-Saharan Africa up to 24 million women may become pregnant each year (Bundy *et al.*, 1995). This high rate is often related to an increase in the susceptibility of pregnant women to infections because pregnancy is a time of high hormone activity which may exert immuno-suppressive effects (Beer & Billingham 1978, McGregor *et al.* 1983) on the child bearing woman.

In Nigeria, although *Plasmodium* infection is generally more prevalent, the occurrence of intestinal helminth infections is also high and hookworm infections and ascariasis, have been associated with iron deficiency anaemia (Obiamiwe 1977, Nwosu 1981, Udonsi 1984, Migasena & Gilles 1987, Obiamiwe & Nmorsi 1991).

It is estimated that 70% of the worm population is harboured by 15% of the human-host population. These heavily infected individuals are at risk of developing severe diseases. The major source of transmission is environmental contamination (Bundy, 1995) Malaria, on the other hand, accounts for about 10% of the total disease burden in many sub-Saharan Africa countries, and over

30% of hospital admissions (WHO, 2002). The distribution of helminths and *Plasmodium* widely overlap on the African continent. However, reports on parasitic infections are usually solely made on malaria or helminths alone. The concurrence of *Plasmodium* and intestinal helminth infection may have a synergistic and deleterious effect on haemoglobin concentration and iron stores, but the evidence to date is contradictory (Mwangi *et al.*, 2006). Pregnant women (and the foetus) are at particular risk of anaemia.

The overlapping distribution of these parasitic infections results in high rates of co-infection (Petney *et al.*, 1998). In pregnancy, there is a transient depression of cell-mediated immunity that allows fetal allograft retention but also interferes with resistance to various infectious diseases (Meeusen *et al.*, 2001).

Although there have been only a few studies on these co-infections in pregnant women; one study in Nigeria showed that > 45% of *Plasmodium* - infected pregnant women also harbored various intestinal helminths. This co-infection was associated with low

hemoglobin level, especially among primigravid women (Egwunyenga *et al.*, 2001).

Despite the increasing interest in the associations between helminths and malaria with anemia in pregnancy, few studies have assessed the occurrence of malaria and intestinal helminth co-infection in pregnancy and its risk factors (Broker *et al.*, 2000).

## **Materials and Methods**

### **Study Area**

This study was carried out in Obowo Local Government Area of Imo State, South East Nigeria. The geographical coordinates of the area is Latitude  $5^{\circ}10'N-5^{\circ}5'N$  and Longitude  $6^{\circ}35' E-7^{\circ}28' E$ . It has an area of 198 km<sup>2</sup> and the vegetation characteristics are tropical rain forest. It experiences a moderate rainfall, with an annual rainfall of 1500mm and average minimum temperature of 20°C. It has two distinct seasons; wet and dry season. The major occupation of the people is farming which is done at subsistence level. Also they produce good quantity of vegetable, palm oil, kernel, broom (local ones) and baskets. Some of the people also embraced small scale trading and fishing. Their houses are made of brick

walls with corrugated metal sheets roofs, few live in mud houses with thatched roofs. Source of water in these area include village stream, boreholes and roof catch water which are stored in buckets, cans etc. Refuse and materials like discarded plastic cans are heaped around houses, schools, roads, and market square (Iwunze *et al.*, 2017). These causes flood during rainfalls and contribute to the breeding of mosquitoes leading to high malaria transmission rate and prevalence

### **Ethical considerations**

Ethical clearance and permission was obtained from the Post Graduate Research Board of Zoology Department of Imo State University, Owerri, Nigeria. Consent was sought and obtained from the Health centre. Informed consent was also obtained from the participants.

### **Study Population**

The subjects were recruited at the Health Centre in Obowo located at the Local Government Area Headquarters on attendance to antenatal care services. In all, 200 pregnant women on their first consultation to antenatal care services were enrolled into the study.

### **Collection and Processing of specimen**

Personal data of subjects relating to age, parity, residence and toilet facilities were obtained with the assistance and cooperation of the hospital staff. Consent was obtained and the participants were interviewed and provided a blood and stool sample. Blood was collected from the participants using hand pricking methods (Ukaga and Nwoke, 2007). Following manufacture instruction, **CareStart™ Malaria Pf (HRP2) Ag RDT** test strip was used to test participants for malaria. Stool samples were obtained for determination of intestinal helminthes and subjected into the microscope using the method of Ukaga and Nwoke (2007)

#### **Data analysis**

Data obtained were analysed manually using percentages. Variables of interest were tested using Chi square statistical analysis at confidence interval of 95% ( $P < 0.05$ ). Tables were used to display results.

#### **Results**

The result show that (table 1) *plasmodium* was the highest parasite 53(26.5) encountered followed by helmith parasites 38(19.0) and a total of 23 (11.5) were co-infected. Statistical analysis shows that there is a significant

difference between *Plasmodium spp*, Helmith parasites and co-infection ( $P < 0.05$ ). Table 2 above shows the overall prevalence of intestinal helmith infection with *Ascaris* been the predominant parasite encountered 13(34.2%) followed by Hook worm 11(28.9%), *Gardia lambia* 8(21.0%) and with *Strongyloides* the least prevalence at 6(15.7%). Statistical analysis shows that there is a significant difference between *Plasmodium spp*, Helmith parasites and co-infection ( $P < 0.05$ ). Table above 3 shows that the patients from age of 26-30 had the highest number of *Plasmodium* 21(41.1%) while patients from the age group 36 and above had the lowest prevalence of malaria infection, 8(19.5%). In intestinal helmith, the age group of 20-25 had the highest prevalence of 13(32.5%) while the age of 36 and above had the lowest prevalence of 6(14.6%). The co-infection of malaria helmith from the table above shows that from the age group 26-30 had the highest co-infection with prevalence of 10(19.6%) followed by age group 20-25 and above with 7(17.5%).

Statistical analysis shows that there is a significant difference between

*Plasmodium* spp, Helminth parasites and co-infection (P<0.05). Among the occupation reported (table 4) shows that petty traders had the highest prevalence of malaria infection 19(35.8%). On the other side Business women recorded the highest prevalence of 13(34.2) for helminth infection while civil servants had the lowest prevalence 5(13.1%). Furthermore, the data on co-infection revealed that more petty traders were infected 9(39.1%) with malaria and intestinal helminth, the least was reported among civil servants 2(8.6%). Statistical analysis shows that there is a significant difference between *Plasmodium* spp,

*Helminth* parasites and co-infection (P<0.05). Women of primigravidae (table 5) recorded the highest prevalence of malaria 32(27.8%) followed by multigravidae 21(24.7%). On the side of helminth infection, primigravidae recorded the highest prevalence of 21(18.2%) followed by multigravide 17(20.0%). Also on co-infection primigravidae recorded the highest prevalence of 13(11.4%) followed by multigravidae 10(8.7%). Statistical analysis shows that there is a significant difference between *Plasmodium* spp, Helminth parasites and co-infection (P<0.05).

**Table 1: Overall Prevalence of Malaria and Intestinal Helminth Co-infection.**

Parasites	No examined	No infected	Percentage (%)
Plasmodium	100	53	26.5
Helminths	100	38	19.0
Co-infection		23	11.5
<b>Total</b>	<b>200</b>	<b>114</b>	<b>57.0</b>

**Table 2: Overall Prevalence of Intestinal Helminth Infection.**

Helminths	No infected	Percentage (%)
<i>Ascaris</i>	13	34.2
<i>Hook worm</i>	11	28.9
<i>Gardia lambia</i>	8	21.0
<i>Strongyloides</i>	6	15.7
<b>Total</b>	<b>38</b>	<b>38.0</b>

**Table 3: Age related Prevalence**

Age	No examined	← No infected →		No co-infection
		Plasmodium	Helmith	
20-25	40	14(35.0)	13(32.5)	7(17.5)
26-30	51	21(41.1)	11(21.5)	10(19.6)
31-35	68	10(14.7)	8(11.7)	3(4.4)
36<	41	8(19.5)	6(14.6)	3(7.3)
<b>Total</b>	<b>200</b>	<b>53(26.5)</b>	<b>38(19.0)</b>	<b>23(11.5)</b>

**Table 4 : Prevalence in relation to occupation**

Occupation	No examined	← No infected →		No co-infected
		Plasmodium	Helmith	
Civil servants	80	8(15.0)	5(13.1)	2(8.6)
Petty traders	137	19(35.8)	11(28.9)	9(39.1)
Business women	120	11(20.7)	13(34.2)	7(30.4)
Artistians	63	15(28.3)	9(23.6)	5(21.7)
<b>Total</b>	<b>200</b>	<b>53(26.5)</b>	<b>38(19.0)</b>	<b>23(11.5)</b>

**Table 5: Prevalence in relation to trimester**

Parity	No examined	← No infected →		Co-infection
		Plasmodium	Helmith	
Primigravidae	115	32(27.8)	21(18.2)	13(11.4)
Multigravidae	85	21(24.7)	17(20.0)	10(8.7)
<b>Total</b>	<b>200</b>	<b>53(26.5)</b>	<b>38(19.0)</b>	<b>23(11.5)</b>

## Discussion

This study showed that malaria and intestinal helminths co infection is a public health problem with pregnant women. Women living in malaria-

endemic areas have an increased risk of *P. falciparum* infection during pregnancy (Bouyou-Akotet *et al.*, 2003). This work agrees with the work done by Ofoha (2007) on the prevalence of

malaria infection among pregnant women in Nwangele Imo State. However, although parasite prevalence and density are higher among pregnant women compared with non-pregnant women, infection with *P. falciparum* is usually asymptomatic (Marchesini and Crawley, 2004).

This study confirmed that malaria is a major problem among pregnant women in Obowo with a prevalence rate of 26.5%. The findings are in accordance with findings from other West African areas: 21.9% in Cameroon (Leke *et al.*, 1999) and 23% in Ghana (Mockenhaupt *et al.*, 2000).

An overall prevalence of 19.0% was observed for intestinal helminth infections. The occurrence of helminth infection at high rates among pregnant women is indicative of faecal pollution of soil and domestic water supply around homes due to poor sanitation and improper sewage disposal. Studies in many parts of Nigeria (Odutan 1974, Obiamiwe 1977, Nwosu 1981, Udonsi 1984, Obiamiwe and Nmorsi 1991) have highlighted the hyperendemicity of soil-transmitted helminths. Maternal women are at high risk of infection because of their close relationship with children.

Also the prevalence is lower than 22.6% observed by Iwunze *et al.* (2019) on their study on the prevalence of malaria among users and non-users of insecticide treated net in Obowo

In many sub-Saharan African countries, women consume soil during pregnancy, and a study in Kenya found that 73% of pregnant women ate soil regularly. (Geissler *et al.*, 1999). This habit might contribute to intestinal helminth infections (Wong *et al.*, 1991).

Approximately 11.5% of the participants in this study were

co-infected with *P. falciparum* and intestinal helminths.

*Plasmodium*/intestinal helminth co-infections in pregnancy is aggravated by low nutritional status of subjects whose staple foods, such as rice, cassava, and maize are poor sources of folate, and iron (Metz *et al.*, 1970, Huq *et al.*, 1983). A similar rate was observed by Egwunyenga *et al.*, (2001) in his study in *Plasmodium* /intestinal Helminth Co-infections among pregnant Nigerian women.

The prevalence rates of *A. lumbricoides* (34.2%) and hookworm (28.9%) (Table 2) were higher than those of other helminths, an observation that has been

made in other studies in sub-Saharan Africa. (Marchesini and Crawley, 2004; Shapiri *et al.*, 2005). The results indicate that the occurrence of *A. lumbricoides* infection and malaria are strongly associated. The mechanism behind this association is not clearly understood, but could be that The profile-associated immunoglobulin E production seen in ascaris infection could down-modulate Th1 antimalarial immune responses, resulting in increased risk of malaria infection (Perlmann *et al.*, 1999).

Observation of this study on the age prevalence (Table 3) showed that pregnant women 20-25 were heavily infected than other age group. These might be that women of 20-25 are not fully aware on malaria in pregnancy compared to women of age group 36 and above who would have been educated on malaria in pregnancy. The younger women show high prevalence rate than the older women which is in line with a major risk factor, with the younger (first time mother) more likely to have malaria and intestinal helminth co infection. Also previous studies have shown that age is associated with malaria, with younger women more at risk (McGregor, 1984).

The prevalence of malaria based on occupation (Table 4), showed that occupation is a factor that can influence the prevalence of malaria and intestinal helminthes co infection. It was observed that among Civil servants, Petty traders, Business women and Artisans, women whose occupation are Petty traders and Trading had the highest prevalence. This could probably be due to exposure to malaria parasite in the environmental conditions and unhygiene lifestyle. Unlike women who are civil servants who perhaps have known what malaria in pregnancy is all about.

It was observed that prevalence in relation to parity (Table 5) shows that primigravidae women have the highest prevalence of malaria than the multigravidae. This is because in an area where transmission is high and the level of acquired pregnancy immunity against malaria is expected to be significant, primigravidae is more affected (Brain, 1998).

### **Conclusion**

This study shows relatively high prevalence rates of malaria, intestinal helminths, and co-infection in pregnant women in Obowo. This high prevalence of malaria, intestinal helminths, and co-



infection have implications for public health practice in that pregnant women in endemic areas should be the focus of control efforts to prevent malaria and intestinal helminths, especially in the ANC setting.

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